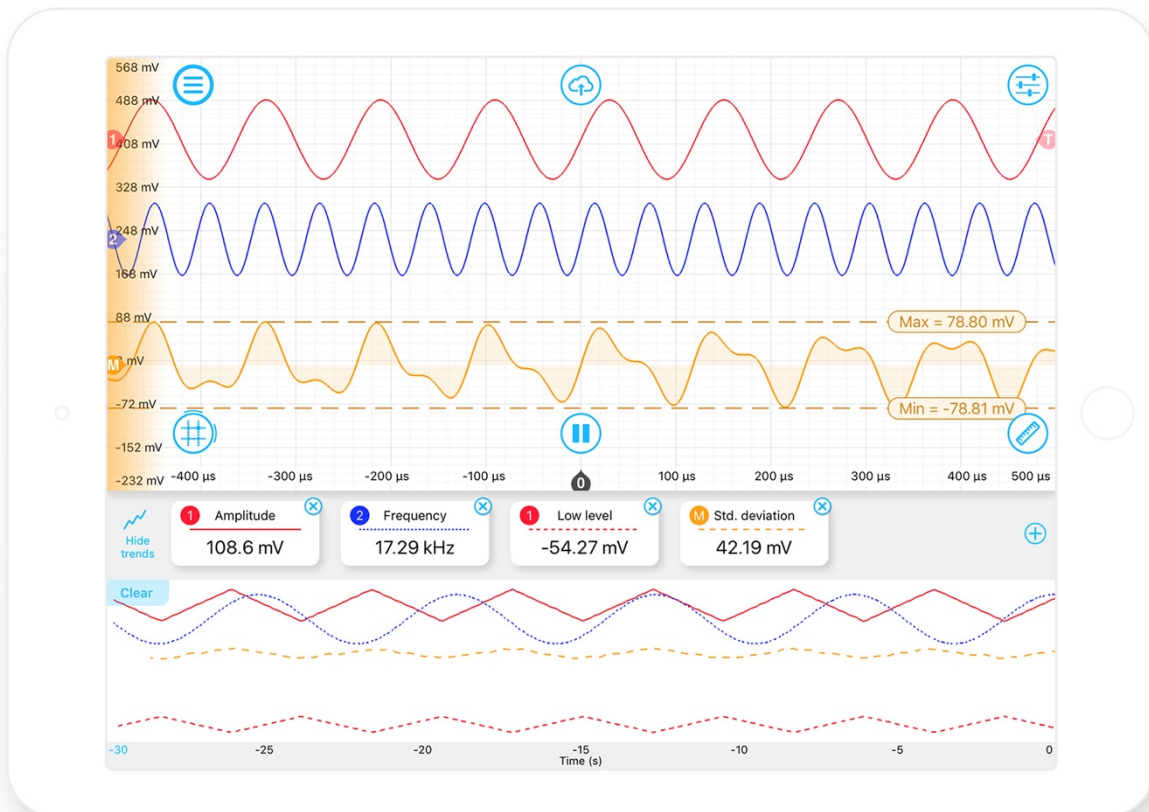




# Oscilloscope

## Description

Moku:Lab's Oscilloscope features two 500 MS/s analog input channels with 200 MHz analog bandwidth, 10 Vpp input voltage range, and user-configurable AC / DC coupling and 50  $\Omega$  / 1 M $\Omega$  impedance. The Oscilloscope also features two integrated waveform generators capable of producing sine waves at up to 250 MHz and square, sawtooth and triangle waves at up to 100 MHz, enabling it to stimulate a system and measure its response simultaneously.



## Features

- Analyse two voltage channels with a vertical range of  $\pm 5$  Volts, 200 MHz analog bandwidth, and maximum sampling rate of 500 MSa/s
- Measure data in precision mode to increase measurement resolution by rejecting noise
- Synthesize sine, square, ramp, pulse, and DC waveforms
- Analyse signals in XY mode
- Quickly measure waveform characteristics, trends and statistics



# Specifications

## Vertical characteristics

### Voltage

Channels	2
Input coupling	AC / DC
Input impedance	50 $\Omega$ / 1 M $\Omega$
Input bandwidth (-3 dB)	> 200 MHz into 50 $\Omega$
Input voltage range	$\pm 5$ V
Input voltage noise	< 200 nV/ $\sqrt{\text{Hz}}$ above 1 kHz at 1 V <sub>pp</sub> input range < 30 nV/ $\sqrt{\text{Hz}}$ above 100 kHz at 1 V <sub>pp</sub> input range < 10 nV/ $\sqrt{\text{Hz}}$ above 1 MHz at 1 V <sub>pp</sub> input range
Vertical resolution <sup>8</sup>	12 bits at 500 MSa/s (ADC resolution) 13 bits at 125 MSa/s 22 bits at 1 kSa/s
Channel-to-channel isolation	> 40 dB

## Horizontal characteristics

### Time

Time mode	Normal, Roll
Horizontal range	1 ns/div to 10 s/div
Delay range	Pre-trigger: 16 kSamples Greater of 32.768 $\mu\text{s}$ or screen width Post-trigger: 2 <sup>30</sup> samples 2.147 s to 1 Ms

### Acquisition

Acquisition mode	Normal, Precision <sup>9</sup>
Maximum sampling rate	500 MSa/s
Memory depth	16,384 Samples per channel 32.7 $\mu\text{s}$ at 2 ns/div
Averaging (linear)	Off, 2 to 100 waveforms
Persistence	Off, 100 ms to 10 s, infinite
Interpolation	Linear, SinX/X, Gaussian

<sup>8</sup> Higher effective number of bits (ENOB) above the physical ADC specification is only available in precision mode.

<sup>9</sup> Precision mode samples the waveform at the full rate and applies a finite impulse response (FIR) low-pass filter to attenuate noise above the usable bandwidth of the measurement sampling rate and prevent aliasing.



## Trigger

### Trigger

Trigger modes	Auto: Triggers automatically after timeout (1 second if previously triggered, 0.05 seconds otherwise) Normal: Triggers only on trigger event Single: Triggers once on a trigger event. Press the 'play' button to re-trigger
Trigger sources	Input 1, Input 2, Output 1, Output 2, External
Nth event	Trigger on the 1 <sup>st</sup> to 65,535 <sup>th</sup> event
Holdoff	1 nanosecond to 10 seconds
Trigger types	Edge: Rising edge, falling edge, both edges Pulse: Positive / negative polarity <ul style="list-style-type: none"><li>10.0 seconds &gt; <b>pulse width</b> &gt; 816.0 nanoseconds</li></ul>

### Trigger sensitivity

Sensitivity modes	Auto: Automatically configures trigger sensitivity based on horizontal and vertical scales Select <i>Noise Reject</i> or high-frequency <i>HF Reject</i> options Manual: Manually configure trigger sensitivity
Manual modes	Relative, Absolute
Hysteresis	Relative: 0.01 div to 5.00 div Absolute: 100 $\mu$ V to 5.00 V

## Measurements

### Measurements

Time measurements	Frequency, period, duty cycle, positive pulse width, negative pulse width, rise time, fall time, rise rate, fall rate
Amplitude measurements	Peak-to-peak, amplitude, maximum, minimum, mean, cycle mean, RMS, cycle RMS, standard deviation, high-level, low-level, overshoot, undershoot
Math	Add, subtract, multiply, divide, XY mode, integrate, differentiate, FFT, min hold, max hold, arbitrary equation mode (using equation editor)
Visualisations	Histogram, time trend



## Cursors

Maximum voltage cursors	5 per channel
Maximum time cursors	5 per channel
Voltage cursor options	Manual, track mean, track maximum, track minimum, maximum hold, minimum hold
User defined reference	A single cursor can be set as a reference for differential measurements using all other active cursors

## Integrated waveform synthesizer

### Synthesizer

Channels	2
Output impedance	50 $\Omega$
Waveforms <sup>10</sup>	Sine, Square, Ramp, Pulse, DC
Output frequency range	1 mHz to 250 MHz
Output voltage range	$\pm 1$ V into 50 $\Omega$

<sup>10</sup> Modulation not available for waveforms synthesized using the oscilloscope instrument.